near the confluence of large affluents draining a wide extent of country. The following official statement of the numbers of the persons drowned, classed according to the departments, will indicate the line of greatest devastation :—Ariège, 73 ; Gironde, 1 ; Haute Garonne, 330 ; Lot-et-Garonne, 20 ; Tarn-et-Garonne, 116 ; total, 540. The discussion of these inundations with reference to the season of the year in which they have occurred in different portions of the Garonne basin, and in their relations to the physical configuration and annual maximum rainfall of each district, indicates a line of inquiry which, if further prosecuted, cannot but lead to most important practical results.

THE additions to the Zoological Society's Gardens during the past week include three Moose or Elks (*Alces machlis*) from N. America, two Arabian Gazelles (*Gazella arabica*) from Arabia, deposited ; a Pig-tailed Monkey (*Macacus nemestrinus*) from Java, presented by the Rev. W. Ewart; a Green Monkey (*Cercopithecus callitrichus*) from W. Africa, presented by the Rev. J. W. Ayre ; an Earle's Weka Rail (*Ocydromus earlei*) from New Zealand, presented by Capt. H. Braddick.

SCIENTIFIC SERIALS

Bulletins de la Société d'Anthropologie de Paris, fascicules 2, 3, 1875.—The former of these numbers gives the discussion which followed the reading of a paper by M. Pommerol, on the rock-excavations, basins, rocking-stones, and holes observable in many of the rocks of Puy-le-Dôme. Contrary to the view which he had advanced in regard to their connection with prehistoric or early historic races, and their formation by man for domestic or religious purposes, the society generally concurred in the opinions maintained by MM. Leguay, Hamy, and Mortillet, that such formations are for the most part the results of natural causes, and that flint implements would have been incapable of acting upon the hard granite of which they usually consist. They admitted, however, that some of the depressions and holes may in a few instances have been enlarged in process of time through human agency, after having become the scene or object of superstitious veneration.—M. Morice laid before the Society a report of the various races which now occupy Cochin China, the most numerous and characteristic of which are the Annamites and Cambodians. Next in point of numbers stand the Chams and the Mois, or mountain-men, and beside these a hybrid race, half-castes between Annamites and the Chinese settlers, and known as Minuongs, is rapidly attaining consideration as a distinct class.—M. Hamy gave a brief summary of a memoir, which he will soon publish *in extenso*, on the craniological characters of the race that now occupies the Island of Timor, and which he considers to be not far removed from the Papuan Negritos. His examination of a number of Timorian skulls has led him to accept as proved the distinctive characteristics assigned to the race by Owen, Busk, and De Quatrefages.—M. Topinard's paper on Australian hybrids gave rise to a long discussion, but can scarcely be said to have contributed directly or indirectly to the elucidation of any of the difficulties involved in the subject.—M. Piette's communication of the result of his exploration of the Gourdan and Lortel caverns is interesting from the fact that, in addition to the ordinary reindeer-lion, aurochs and other animal remains found in such caves, he discovered parts of two human jaws. One of these—the lower maxillary bone of an adult man, to which several much-worn teeth were still attached—was found at Gourdan in close proximity to bones referred by the author to *Cervus canadensis*, or a closely allied form. The other jaw, apparently that of a child of seven, who had died during dentition, was excavated from the floor of the Lortel cavern at a depth of 6 metres.—M. Condereau laid a paper before the Society, and explained the elaborate series of tables which he has constructed to illustrate his system of the classification of articulate sounds, and which he hopes to see accepted by anthropologists as the basis of some uniform phonetico-physiological alphabet, by which writers of different nationalities may be brought on a common ground for the comparison of the different articulate sounds of which the human voice is capable.—M. Broca brought under the notice of the Society a negro skull belonging to their museum, where it forms the fifteenth in the Gannal collection, in order to show how the normal parietal foramina may present such unusually large dimensions as to assume after death the appearance of artificially produced parietal perforations. At a previous meeting of the Society, on March 18, M. Broca had exhibited a skull taken by M. de Palmas from an ancient cemetery in the Canary Islands, which presented a double parietal opening.—A very interesting and important paper was read by M. Broca on May 20, when he laid before the Society a *résumé* of the "Craniometrical Instructions" which they had commissioned him to draw up for the guidance of anthropologists. In accordance with the directions of the Commission these instructions are preceded by a description of the anatomy of the head, in which an entirely new anatomical nomenclature has been adopted, for which M. Broca craved the approval of his *confrères* on the ground of the obscure terminology hitherto in use in craniology. Among a number of novel terms we may instance such words as endocranium and exocranium ; pteron and discus for the ascending and the horizontal parts of the greater ala ; inion for the external protuberance of the occipital ; and basion, opisthion, staphanion, pterion for distinctive portions of the occipital, frontal, and temporal fossa. M. Broca announces that this new system of cranial terminology will be soon published *in extenso* in the "Memoires" of the Society.—M. Collineau, in connection with the subject of arrest of development in the osseous and other parts of the brain, as shown by M. Broca in his paper on parietal perforations, drew attention to the extraordinary spread of religious mania in France, of which he gave numerous instances amongst the higher as well as lower classes, and appealed to medical and other scientific men to devote themselves to the elucidation of this important subject.

Der Naturforscher, November, 1875.—This number contains an account of some interesting researches by M. Exner, on the capability of perceiving a time-difference between two impressions of sense. Suppose a stimulus to act at moment *a*, and another at moment *b*, how near may *a* and *b* come together and the impressions continue distinct? M. Exner examines the various cases of two impressions on the same, and on different elements of an organ of sense, on similar elements of a pair of organs, and on elements of different sense organs.—From experiments on decomposition of albumen in animal bodies, M. Forster concludes that the blood of one animal introduced into the vascular system of another behaves like the blood already present ; that albumen solutions brought into the blood are decomposed like albuminous substances received through the stomach and intestine ; and that, of the albumen present in the body, that which is firmly held in organs and cells is but little decomposed, while that entering the intestine or blood-vessels in solution is mostly decomposed.—The physical properties of a freezing mixture of sulphuric acid and ice are investigated in a paper by M. Pfaundler, and M. de Coppet discusses superfusion and supersaturation according to the mechanical theory of heat. Most of the remaining papers hardly call for notice here.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Dec. 16, 1875.—Note on the Placentation of Hyrax, by Prof. Wm. Turner, of Edinburgh. The author describes the result of his study of a spirit specimen, his object being to verify or refute the recent statements of MM. H. Milne-Edwards and George, which, contrary to the observations of Sir E. Home, Owen, Huxley, and others, are to the effect that the placenta of *Hyrax* is non-deciduate. He shows that the placenta of *Hyrax* is deciduate, like that in the cat, which it resembles in form ; it has also a large allantoic sac.

Geological Society, Dec. 15, 1875.—Mr. John Evans, F.R.S., president, in the chair.—Francis James Bennett, Alfred Allinson Bourne, Charles Thomas Clough, John Law Cherry, William Herbert Dalton, Walter Saise, James Weeks Szlumper, and Lamont Henry Graeme Young, were elected Fellows ; and Prof. August Quenstedt, of Tübingen, a Foreign Member of the Society.—"Notes on the Physical Geology of East Anglia during the Glacial Period," by Mr. W. H. Penning. The author wished it to be understood that his remarks were intended to form a sketch, rather than a detailed account of the subject to which they relate. He intended to explain the origin of the so-called "middle glacial" gravels and sands, to account for their occurrence in certain areas and their non-occurrence in others, where they might reasonably have been expected. Also to briefly describe a certain series of gravels of doubtful age and origin in the

Cambridge valley. A short description of the geology and physical features of the district was given, and an inference drawn from the varying faunas of the "Crag" that the land was sinking during that era and until after the deposition of the Cromer "Forest-bed." Then Arctic conditions began to prevail, and the great glacial subsidence commenced; the "lower glacial" beds were formed, and succeeded by a large series of false-bedded gravels and sands, with intercalated patches of unstratified clay. These deposits run up only to a certain level, about 300 feet, never quite reaching the top of the chalk escarpment, where the overlying boulder-clay is invariably found resting on the older rock, without any gravel or sand between. The author inferred from this circumstance that after the deposition of the "lower" beds, and as submergence went on, the waters of the North Sea were again united to those of the Atlantic. A strong current was thus set up, which swept down from the north, bringing with it the material of which the gravels are composed, and which is found to consist of pebbles, all derived from the northern and eastern coasts, mixed with flints from the chalk. The escarpment of this formation stood at the time above the water, but when once sufficiently submerged to admit the water over its lower portions, the conditions were altered, the current lost its force, and the deposition of gravel ceased. An occasional iceberg had dropped its load of unstratified clay, which became intercalated with the gravels, but the greater number of such bergs were quickly swept away to the south. Now the waters had access to a larger area, the formation of gravel was succeeded by that of boulder-clay, which in the author's opinion is entirely composed of masses of clay enclosing boulders, brought down and dropped by icebergs *in mass*, which accounts for its want of stratification. This boulder-clay rests evenly on and at the higher level overlaps the "middle glacial" sands; it then caps the chalk escarpment and plunges down into the Cambridge valley, even to the present level of the sea; but in no instance on or beyond the escarpment does any sand or gravel intervene between it and the older geological formations, although just over the scarp (on the south side) the gravels run up to an elevation of 300 feet. The gravel-forming currents were evidently confined to the seaward side of the chalk range, and excluded from the Cambridge valley, which is undoubtedly *pre-glacial*, and which formed at the time a large inlet, land-locked on every side but one, discharging its waters through the opening now occupied by the estuary of "The Wash." In the Cambridge valley there are sheets of river-gravel of recent date, some patches of doubtful age, but not traceable under the boulder-clay, and an elongated series of gravels at a level of 20 to 60 feet above the present level of the Cam. These are in some parts distant from the present course of the river, and present a striking resemblance to glacial gravels; but as they here and there contain recent shells, and taking into consideration their uniformity of level, the author concludes that they indicate an ancient course of the River Cam. The other conclusions arrived at, after mature consideration of all the evidence hitherto obtained, are—that a gradual passage will be found to exist from the base of the crag up to and through the drift-deposits to those of recent date; that in East Anglia we have evidence of but one, and that a gradual period of glacial submergence succeeded by a corresponding movement of re-elevation; and that there are no "middle glacial" deposits whatever within the area of the Cambridge valley.—"Denuding Agencies and Geological Deposition under the Flow of Ice and Water, with the Laws which regulate these actions, and the special bearing on river-action, of observations on the Mississippi and other great rivers, and their present and past Meteorological conditions, and similar remarks on Marine Deposits, illustrated by the Irish Sea and the Chesil Beach," by Mr. A. Tylor. The writer adduced evidence by measured sections and drawings to show that the Quaternary gravels were deposited rather in a wet or pluvial than in a snowy or Glacial period. He thought the denuding action of springs and the alternate action of rain and frost had been neglected. He considered Agassiz and other writers had overlooked the previous writings of Playfair, to whom he referred. The rainfall of Westmoreland, Switzerland, and the Mississippi valley were compared in summer and winter to prove that floods were not necessarily greater from land covered with snow than from land covered with trees and vegetation when height above the sea and local circumstances were taken into consideration. Mr. Dana's "Great Glacier," whose melting was to supply a Quaternary river, Mississippi, 50 miles wide, would require a supply equal to 625 times the present rainfall to fill it. The melting of snow was assumed to be of such proportions by modern writers as to equal the débâcles of older geologists. The high Swiss mountains pointed to a greater diminution of snow on high ground in the Glacial period; and he believed the clouds then discharged near the sea-level, so that the mass of snow and ice was at low levels. It appears that in Greenland in the 80th parallel, according to Nordenskiöld, near the sea in summer there is no snow on the ground 1,000 or 1,500 feet above the sea. Open water at the poles must depend upon the abstraction of the vapour from the atmosphere at lower latitudes; and probably in the Glacial period the ice-cap was thickest at the 70th parallel of latitude. Mr. Tylor thought the theories of former depressions of the land, as in the Mississippi valley, should be tested by examination for flexures. He had found (in 1868) that flexures, and fractures, had very much affected the course of the Wealden denudation in the Quaternary period. The laws of river motion are very simple and precise; and as depressions and upheavals are always unequal, any great movements in the Quaternary period would affect the courses of rivers, and be traceable in their deposits. The author had measured the *remaniés* valley gravels of Coalbrook Dale, which were associated with marine shells 200 feet above the sea, and compared their contour with ordinary valley gravels and with marine beaches, to ascertain under what probable conditions the sea had risen up the Severn valley without leaving any traces of cliffs or marine denudation except between Bridgnorth and Coalbrook Dale. The diamond gravel-deposits in Africa have a similar contour to those of Coalbrook Dale. The position of the Moel Tryfaen beds was first described by Trimmer in 1831. Trimmer, an excellent geologist, observed the scratches on the rocks covered by the gravel with marine remains, and noticed their ice-origin, but did not draw, unfortunately, the natural inference that there must have been a Glacial period in Wales. This great discovery or invention was left to Agassiz to propose in 1837. The glacier-eroded lakes, much lower than Moel Tryfaen, and close to it, are free from marine remains, therefore it seems difficult to suppose a depression of 1,300 feet and immersion in the sea of Tryfaen, and subsequent elevation, could have taken place without having left any marks on the land except at one spot. The measured section of the Chesil Beach shows its close approximation to a binomial curve, and the regularity of beaches and littoral zones along the Channel teach us what are the certain consequences of land being immersed under the sea. Mr. Tylor produced plans and sections showing how the tide actually affects the sea-bottom, and described the gorge below 50 fathoms in the Irish Sea. He treated the tide as caused by the alternate and opposite slow movement of the deep and great mass of the Atlantic, giving motion to the water at the coast almost simultaneously as if the whole water moved as one mass over an area of thousands of square miles. The velocity of the tide of one tenth of a mile per hour in a deep sea, produced by the composition of forces a tide of a velocity of three or four miles an hour on the coast. High and low water at different ports are the direct consequences of local currents in shallow water, set in motion by the greater mass of deep water. There are points in the English Channel where within a few miles there is a difference of six hours in high water. He objected to the theory of a tidal wave travelling in one direction, and moving faster in deep water than in shallow, because the tide really travels quicker in shallow water, as his plans show. In support of this he showed the chart of the Channel, and that the tide turned in the Irish Sea at all points, deep or shallow, almost simultaneously and synchronously with the slow tidal movement in the Atlantic. He found that in a large area of sea of 120,000 square miles, where the water averaged 67 fathoms off the Scilly Islands, the velocity of the tide was only one mile per hour, but in the shallows near the Channel Islands, where the depth was on an average 12 fathoms, by the composition of forces the velocity of the tide increased to 6 miles an hour. If the tide was the consequence of a tidal wave bringing high water, the tidal conditions of the Irish Sea would be very different from what they are described to be. He did not find any evidence of a plane of denudation on any sea coast, but, on the contrary, deep gorges and curved surfaces, depth varying with width, &c. The nearest approach to a plane surface was in the estuary of the La Plata; but that flatness appeared more the consequence of deposition than denudation. The great cuts or indentations out of coast lines where rivers discharge into the ocean, when compared with the absence of indentations in areas where there are no great rivers, but where the rocks are equally hard, showed that such denudation depended upon the alternate and opposite action of rivers and the tide. He referred to the removal of the bar

of the Danube, and to the great laws which regulate the flow of water, which he illustrated by diagrams. Hydraulics and meteorology must be studied in connection with the lines of denudation and deposition; and however difficult and inconvenient these subjects might be, no results would be reliable unless all the physical circumstances were taken into account.

Anthropological Institute, Dec. 28, 1875.—Col. A. Lane Fox, president, in the chair.—Major H. H. Godwin-Austin, E. Willett, Mrs. T. Cowie, and A. L. Lewis, were elected members.—Mr. John Evans, F.R.S., read a note on a proposed international code of symbols for use on archæological maps, which had been prepared by the sub-committee appointed at the Stockholm meeting of the Congress of Prehistoric Archæology.—Miss A. W. Buckland read a paper on divination by the rod and by the arrow. The author endeavoured to prove:—1. That from personal observation, rhabdomancy is still practised in England in certain localities, and that it is a survival of a very ancient superstition originating in the use of rods as symbols of power. 2. That the staff as a sceptre was probably a later form of the horn which was thus used in very early prehistoric times, and in that character adorned the heads of gods. 3. That from the use of rods or horns arose a veneration for them as possessing the inherent power of healing disease and even of restoring life. Hence their use by magicians in all ages and countries, the chief instruments employed by them being a ring or circle, and a staff and a bifurcated stick. 4. That these symbols conjoined are found in Egyptian, Assyrian, and Peruvian sculptures, and may be traced in some of the stone circles of Britain, and in the shape of Irish and African brooches and fibulæ. 5. That from the belief in the magical powers of rods perhaps arose tree-worship, or at least such veneration for trees as is observable of the oaks of Dordona and of the Druids, the ash of Scandinavia, and, for some unexplained reason, more particularly of the hazel. 6. That belomancy, or divination by marked arrows, said to be of Scythic origin, was practised in Babylon, Judæa, and Arabia, and that traces of it may still be found in the folk tales of Russia and Siberia. 7. That the mode of using these arrows had a strong resemblance to the very ancient custom of casting lots common to all peoples ancient and modern. 8. That the invention of lots and dice, as well as that of the divining rod, is ascribed to Hermes or Mercury identified with the Woden of Scandinavia, and by some writers also with the India Buddha. 9. That a strong resemblance exists between the implements of magic and the ancient alphabets, also the reputed invention of the same god or gods. 10. That many of the signs or letters forming the Archaic-Phœnician, and other alphabets, are found in the rock sculptures of Peru, thus adding one more to the many proofs of a communication existing between the hemispheres in prehistoric times. 11. That the arts of magic and divination were not of Aryan origin, but remnants of the Turanian or Pre-Aryan faith which once overspread the world. 12. That this is proved by their present existence among aboriginal non-Aryan races, and may, perhaps, even be used as a test of race, so that those who in Somerset and Cornwall are said to possess the power of divination by the rod may possibly have some remote affinity with the aboriginal inhabitants of Britain.

Victoria (Philosophical) Institute, Jan. 3.—Several new members were elected. The yearly statement showed the institute's sphere of action had been much extended of late. The Rev. R. Thornton, D.D., read a paper on "Scepticism," the concluding one of a series of four.

PARIS

Academy of Sciences, Dec. 20, 1875.—M. Frémy in the chair.—The following papers were read:—Theorems in which there are couples of segments having a constant relation, by M. Chasles.—Formula of the quantity of magnetism removed from a magnet by an iron contact, and of the portative force, by M. Jamin.—Critical remarks on the theories of formation of saccharoid matters in plants, and particularly in the beet, by M. Cl. Bernard.—Note on the order of Aug. 14, 1875, prohibiting the importation of fruit and other trees into Algeria, by M. Blanchard.—Expedition to Campbell Island; memoir on the chlorination of sea-water, by M. Bouquet de la Grye. The law enunciated by Gay Lussac and Humboldt for the saltness of the Atlantic is also true for the Pacific. Having represented graphically the relation between dilatation, temperature, density, and chlorination, the author seeks to analyse some phenomena of equilibrium of the sea.—Exposition of a new method for resolution of numerical equations of all degrees (second part), by M. Lalanne.—New researches on the interior magnetism of magnets, by MM. Trève and Durassier.—Researches on *Eucalyptus globulus*, by M. de Hartzen. The resin of *Eucalyptus* contains tannin and several fatty matters.—Action of mineral salts on the crystallisation of sugar, and determination of their coefficients, by M. Lagrange. Of the various salts contained in sugar, the chlorides are the least melassigenous; next come the sulphates and carbonates. The nitrates of potash and soda have the most prejudicial action to crystallisation.—Action of nitric acid on the phosphates and the arseniates of baryta and of lead, by M. Duvillier.—On the exchanges of ammonia between natural water and the atmosphere, by M. Schlœsing. With the same tension of ammonia in the air, the quantity of alkali dissolved in a natural water, up to equilibrium of tension, decreases rapidly as the temperature rises.—On the propagation of heat in rocks of schistous texture, by M. Jannettaz.—On aniline black; observations on a communication of M. Coquillion, by M. Rosenstiehl.—Note on the action of ozone on animal substances, by M. Boillot. Fifty grammes of beef enclosed in ozonised air were fresh and unaltered at the end of ten days.—On the myology of carnivora, by M. Alix.—On the pathogeny of deaf-mutism, improperly called congenital, by M. Tripier. Only about a fifth of those said to be born deaf are so really. In the other four-fifths deafness comes suddenly about two or three years of age.—On a crystallised boride of manganese, and on the *rôle* of manganese in the metallurgy of iron, by MM. Troost and Hautefeuille.—On the oxyfluorides of niobium and of tantalum, by M. Joly.—Determination of alkaline metals in the silicates, and in matters unattackable by acids, by means of hydrate of baryta, by M. Terreil.—On a new mode of production of trichloracetic acid, by M. Clermont.—On the classification and the synonymy of the stellarides, by M. Perrier. On T nerve-tubes, and their connection with the ganglionic cells, by M. Ranvier.—On the nerve-terminations in the electric plates of the torpedo, by M. Ranvier.—Remarks on a memoir of M. Tschermak, on the geology of meteorites, by M. Meunier.—M. Milne Edwards presented the first volume of "The Natural History of the Mammifers of Madagascar," by MM. Grandidier and Alph. Milne Edwards.

VIENNA

Imperial Academy of Sciences, Nov. 11, 1875.—MM. Toldt and Zuckerhandl communicated a paper on the changes of form and texture in the human liver during growth.

Nov. 18, 1875.—A paper was read by M. Liebermann, on the chlorophyll of the colouring matters of flowers and their relations to the colouring matter of blood. He thinks chlorophyll consists of two substances, chlorophyllic acid and phyllochromogen. The latter arises from chlorophyll through decomposition, and is probably what gives the various colouring matter of flowers by oxidation.

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